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Rocky Mountain Botany.

A GENERAL REVIEW.

It is now just forty years since the present writer began his field studies of the vegetation of the Rocky Mountain region, in what was then Colorado Territory. In April, 1870, there were no public centers of botanical study, no libraries or herbaria, no resident students of the Rocky Mountain flora within the whole length and breadth of that land. There did not exist even the beginnings of any such thing as a local handbook of descriptive botany for the region, or for any part of it. To something like a comprehensive help to general plant study there, some approach was made a little later, in the Botany of Clarence King's Expedition, with its several very useful monographic supplements; but this book was not yet extant in 1870; and, until a much later date, the most ample library equipment for a student of Rocky Mountain botany could contain no books more serviceable than the two volumes of the unfinished Flora of North America, by Torrey and Gray, the botanical parts of several Pacific Railway Survey Reports, and certain monographs of western families and genera by Torrey, by Engelmann, and by Asa Gray, including the last named author's list of Colorado plants of Parry, Hall and Harbour, wherein a few new Colorado species had been described.

In this year 1870 it was the opinion of the highest authority that by the copious gatherings of Parry, Hall and Harbour, the botanical field of the Colorado Rocky Mountains had been well nigh exhausted. I have a letter from Asa Gray, written to me while I was still in Colorado in 1871, which closes with this remark: "I hope you will find some new species; but you will be sharp if you do." Three years later than this, namely in the beginning of 1874, there came forth from the Government printing office in Washington as a part of the U. S. Geological Survey Report, a thick pamphlet entitled, "A Synopsis of the Flora of Colorado." The author of this was Thomas C. Porter. The name of J. M. Coulter held a subordinate place on the title page; but every paragraph of original work was claimed by Professor Porter as his own. To those who knew the man, no question will be raised as to his sole authorship of the book. The work itself was of value to beginners in Colorado botany, notwithstanding that for all species of plants not peculiar to the region, reference was made to Gray's Manual of the eastern botany for the descriptions. To my own library the book was not a very significant addition, for the reason that at this time I had myself done

tenfold more work on Colorado botany than my friend Professor Porter had done. With the exception of eight or ten new species which had been gathered in southwestern parts of the Territory unvisited by me, most of the plants enumerated in the book were more familiar to me than to the author of the book, or to any other, for I had now devoted four years rather continuously to the study of this field, and had detected many plants which had not been found there by any of my more transient predecessors. These results of my researches, asked for by Professor Porter, found special mention by him in his Preface.

During eleven years next succeeding the appearance of this first Colorado Flora, I had traversed much of Colorado, Wyoming, California, Arizona and New Mexico. Within this period I had acquired a fuller knowledge of far western botany than had ever before been gained by an individual botanist; and the abundant new facts gathered, in as far as published at all, had been published in the main by Asa Gray; this also not so much by sending him new types as by indicating the characters of species already long in his possession, but, wrongly placed by him because of his failure to see the characters.

I shall never be chargeable with having been premature in making my beginnings at authorship on Rocky Mountain botany. To the study of this flora and other more or less related floras, to the eastward, westward and southward of it, I had devoted sixteen years; and a very considerable part of the knowledge gained so laboriously and devotedly, I had given to another to publish as his own. I was already 42 years old and more, when, in 1885, I published my own first paragraph of new Colorado botany.

Coetaneously with this little event, there came forth from the press a volume with the large title of a "Manual of Rocky Mountain Botany." Its author, in his Preface, commendably disclaimed any particular knowledge of the region named. Still, as a mere compilation from books and monographs by men accepted as authorities, the work must have subserved some useful purpose in the hands of plant lovers touring in the summer time in Colorado Mountains; people who could not have carried with them so conveniently the volumes of Gray's Synoptical Flora, and Englemann's quarto Monographs. I was located in California when this book appeared, and it found a place on my library shelves. This was a quarter century since; and, though during the whole of this period I have wrought more than any other upon Rocky Mountain botany, I doubt if I have consulted the book a half dozen times. For the real student of that flora there was nothing in it.

From 1885, another twenty years and somewhat more had passed when there was announced "A Flora of Colorado, by P. A. Rydberg;" this in 1896. Those twenty years covered a period of the greatest activity of exploration and research into Rocky Mountain botany. Within those two decades more, and more effective, work had been done in that field than in the hundred years preceeding them. My own contributions in California Academy Bulletins, in the five volumes of my *Pittonia*, and in earlier volumes of the journal *Erythea*, which I had established, will be cited henceforward for the greater part of this constructive work; and next after my own, both in point of time, and the amount of work accomplished, are the extensive contributions of Dr. Rydberg, in his "Flora of Montana," and in a long list of able studies published largely in the Bulletin of the Torrey Club. The call upon Dr. Rydberg to prepare a Colorado Botany came from the State itself; and he can not but have set his hand to the task with some enthusiasm; otherwise he could not have fulfilled it so well.

This Colorado Flora of Rydberg I cannot help thinking of as having made possible another book of Rocky Mountain botany, which, only three or four years behind it, has lately appeared under the title of a "New Manual of Botany of the Central Rocky Mountains." The authorship is divided between Professors John M. Coulter and Aven Nelson. It purports to be a new edition of the old compilation of 1885, yet is said to have been written entirely by my friend the Professor at Laramie, Wyoming; and it is about as different from the earlier book as can well be imagined; is even an incomparably more useful book; this notwithstanding that the earlier "Manual" was in a manner faultless, while this later one is full of faults.

However, the only book with which instructively to compare Professor Nelson's work is not the Rocky Mountain Manual of twenty years since, but Rydberg's *Flora of Colorado*, named above, and almost as recent.

The first of several contrasts that will be noted by one acquainted with the whole field will be in respect to the dimensions of the books; for the Rydbergian volume, embracing probably less than one-third the geographic area of the Nelsonian, and which ought to have been by much the smaller of the two, is manifestly the larger; and this despite the fact that in it there are no diagnoses of the genera or species, whereas in the other both genera and species are described, and that in no cramped or niggardly manner. But this contrast of dimensions might chance to prove of no great significance. In truth, the paper is thinner in the Nelsonian volume, also the type used is a trifle smaller. Yet again, the Rydbergian page

is both longer and broader. But we shall make a more fair comparison—at least a more significant one—by taking a census of the pages. The volume of the small territory has about 410 pages, that of the thrice larger, about 610. This, in view of the fact that in the book for the one state there are no descriptions, while in that covering almost four states as large, there are full diagnoses, is a contrast almost amazing; for, we who know well how speedily and multifariously environments change throughout the whole Rocky Mountain region, understand well that an honest flora of all Colorado, Wyoming and Montana, plus half of New Mexico and Utah, must embrace, if not twice as many plants as Colorado alone, at the very lowest possible estimate, one-third as many more. At this point we may take the testimony of each author himself as to the phytologic contents of the two fields so vastly unequal in extent. For Colorado alone, Dr. Rydberg enumerates 2,912 species; for the three of four times greater area, Dr. Nelson lists only 2,733 species; admitting, however, as by way of accounting for this astounding discrepancy that, of other—and we add, older and more experienced—authors' species he has reduced 1,788. These large reductions to synonymy include species by even that most conservative of American botanists, Asa Gray; also according to an estimate of my own, somewhat less than 400 species of Dr. Rydberg, whom I hear people speak of as having been Dr. Nelson's botanical father. If so, this will remind us of a common Old World plant which, in mediaeval Latin nomenclature, they called *filius ante patrem*. Such almost wholesale suppression of other men's contributions to Rocky Mountain botany will seem at first thought hard to excuse or condone; perhaps the more difficult after one has noted that the very few Coulterian as well as the multitudinous Nelsonian species are commonly maintained as valid. I doubt very much that any botanical community on either side of the Atlantic will be found to be of the opinion that Dr. Rydberg and I are the reckless species makers, and that Dr. Nelson is the careful, cautious and discrete conservative. I, who have noted the very beginnings of the botanical career of each man now active in North American botany, have no such opinion of my friend in Wyoming, nor, as I said, do I believe it exists anywhere.

Let us look now somewhat more closely into the question; and that by way of considering the membership of some particular genus. It may as well be *Senecio*, for that is a very ample one, and is abundantly represented in the Rocky Mountains. Going back a quarter-century into the past, and to a time when only one name of botanist now active in Rocky Mountain botany had yet been heard, we shall find that we

had then one standard book in which *Senico* was treated of and that for the whole of North America, north of Mexico. Gray's Synoptical Flora has of this genus, for the whole country only about fifty species. Of this number, by the way, one-tenth are therein credited to the present writer. They constitute the sum of all the senecios which, up to 1884, I had published; and Dr. Gray, above all American botanists, abhorrent of imaginary or feeble species, questioned the validity of none of them.

Coming down now from 1884 to 1906, a period of 22 years, Dr. Rydberg in his Colorado book, has 66 species of *Senecio*, a dozen or fifteen more than Gray had admitted for all North America. I note also here that not barely one-tenth but one-third of the Colorado senecios are mine according to Rydberg. But now, to the whole of Colorado, plus almost or quite thrice as much territory adjoining it, Dr. Nelson accords only about 40 species to the genus: two-thirds as many only, for the trebly extended area as for Colorado alone; and in the process of reduction of them for the Rocky Mountain Manual, some 15 of my senecios have fallen decapitate, and some 25 of those of my colleague Rydberg. The *Senecio* genus may be a not unfair example to have chosen by which to demonstrate how this book for almost the whole Rocky Mountains should not have been made a smaller volume than the one embracing Colorado only. Other large genera in families in which the bulk of later work has been done either by Dr. Rydberg or by myself, or by both, would probably yield similar statistics. Also, as somewhat in criticism of the able author of the Colorado Flora, I am bound to note here, what I have observed through many years, that he is too impatient, apparently, of studying descriptions. On this account he has published over again, as new, a rather long list of things which I had clearly published at earlier dates. Not a few of Dr. Nelson's reductions of Rydbergian species consist in a mere showing that I had published the same plant before. In *Senecio* one such case has remained undetected by the author of the later Manual. Both he and Rydberg have a *Senecio altus* Rydb. It is precisely the same as my *S. sphaerocephalus*, which was published four years earlier.

While we have still in mind this matter of the suppression of species for which the book is so conspicuous, let us not fail to note one circumstance that may seem to ameliorate the situation, or at least to mitigate in some degree the offense against men as able and as conscientious as any who have worked in this field. The writer of this Manual, quite unlike some of his contemporary authors, is careful to cite the place of the publication of such species as he suppresses. Really

this is the least that can be done in the spirit of justice to science and of honest dealing with one's fellow botanists. In this way it is made easy for any student to consult the descriptions of hypothecated or rejected species, and so he is helped to the means to form his own judgment about them. And the commendability of these bibliographic notes or citations is all then more manifest in view of the certainty that, occupying no inconsiderable amount of space, the cost of printing the book has been increased, and the profits from the copy-right have been in the same ratio diminished.

Men have already criticized, and will further complain of, the unevennesses and inconsistencies of this book; the development of some of the plant families being according to the latest and best results of careful research, while other groups are left in a sort of archaic *statu quo*. In the family of the borraginaceae, for example, there was a genus called by a barbarous name, *Krynitzkia*, and credited with 11 species, this according to the old Manual, which same group in the new consists of the three genera *Allocarya*, *Cryptantha* and *Oreocarya*, with an aggregate of 33 species. By the same criteria, that is, by characters, both generic and specific that are of equal value, the genus *Polygonum* should have been resolved into the four genera of *Polygonum*, *Persicaria*, *Bistorta* and *Bilderdykia*, with increase of species nearly in proportion; yet the *Polygonum* of the new Manual differs from that of the old one in no respect except by the increase of the species number of 16 in the earlier to 28 in the later edition. And while such perfectly natural and marked genera as *Persicaria* and the others are ignored, such comparatively feeble generic proposition as *Anogra*, *Pachylophus*, *Lavauxia*, *Galpinsia* and *Sphaerostigma*, artificial and questionable segregates from the old *Oenothera* are sustained in the new book; and over against this rather forced segregation in the Onagraceae, there stands as of old the archaic and impossible genus *Rhus* of Linnaeus in the new volume, quite as in the old. Nevertheless, let no one who complains of these inequalities in the new Rocky Mountain Manual attribute them to that work as peculiarities. There are other books of the kind, too many of them, that have the same fault.

We have now, and almost all at once, also after long waiting, two highly serviceable octavos of Rocky Mountain systematic botany. We have rejoiced and shall rejoice in both of them. Moreover, we shall be glad again, and more glad, perhaps, when Dr. Rydberg's long hoped for volume—or volumes—on the same great flora shall have appeared.

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